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Data4

SMART & SCALABLE DATA CENTERS

MIL - DC12

RIBA3 - Stage

T04 - GENSETS - Data Sheet -Genset and Dry-Cooler

Date : 14/10/2024

Reference : T-TD23059-55-A

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T04 - GENSETS - Data Sheet -Genset and Dry-Cooler

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A	31/08/2024	First emission	☒ M.FUENTES	☒ C.MOUCADEAU	☒ A.FONTAINE
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☒ *: document verified / approved*

CLIENT	CAMPUS	PROJECT	PHASE	TRADE	AUTHOR	TYPE	STEP	LEVEL	NUMBER	VERSION
D4	MIL	DC12	RB3	T04	CAP	DSH	ALL	ALL	001	B

KOHLER

Industrial Diesel Generator Set – KD4000-E
50 Hz - Emission Optimized – EPA Tier 2 Compliant

RATINGS 11000 V - 50 Hz		
Standby	kVA	4050
	kWe	3240
Data Center / Mission Critical	kVA	4050
	kWe	3240
Prime	kVA	3680
	kWe	2945

HVO

Benefits & features

KOHLER premium quality

- KOHLER provides **one source responsibility** for the generating set and accessories
- The generator set, its components and a wide range of options have been **fully developed, prototype tested, factory built**, and production-tested
- Generators sets are designed in accordance with ISO8528-5, performance class G3
- Generators sets accept the rated load in one step outside the ISO8528-5 operating limit values
- Approved for use with HVO (Hydrotreated Vegetable Oil) according to EN15940

KOHLER premium performances

Engines

- Low fuel consumption thanks to a high technology common rail injection engine
- A smaller footprint thanks to a high power density
- Low temperature starting capability
- Long maintenance interval

Alternator

- Provide industry leading motor starting capability
- Excitation system to permit sustained overcurrent > 300% In, during 10 sec
- Built with a class H insulation and IP23

Cooling

- A flexible solution using an electrical driven radiator fan
- High temperature and altitude product capacity available

Control Panel

- The KOHLER wide controller range provide the reliability and performances you expect from your equipment. You can program, manage and diagnose it easily and in an efficient way

KOHLER worldwide support

- A standard three-year or 1000-hour limited warranty for standby applications.
- A standard two-year or 8700-hour limited warranty for prime power applications.
- A worldwide product support

GENERAL SPECIFICATIONS	
Engine brand	KOHLER KD Series
Alternator commercial brand	LEROY SOMER
Voltage (V)	11000V - 50Hz
Standard Control Panel	M80-D
Optional control panel	APM802
Emission level	Emission optimization
Type of Cooling	None
Performance class	G3
One step load acceptance (out of ISO criteria)	100%

GENERATOR SETS RATINGS							
	Standby			Data Center / Mission Critical		Prime	
Voltage	kWe	kVA	Amps	kWe	kVA	kWe	kVA
11000/6350	3240	4050	213	3240	4050	2945	3680

DIMENSIONS COMPACT VERSION	
Length (mm)	6686
Width (mm)	2248
Height (mm)	2829
Tank capacity (L)	-
Dry weight (kg)	26000

DIMENSIONS SOUNDPROOFED VERSION	
Type soundproofing	NOT AVAILABLE

KOHLER.

Industrial Diesel Generator Set – KD4000-E
50 Hz - Emission Optimized – EPA Tier 2 Compliant

Engine

General	
Engine brand	KOHLER KD Series
Engine ref.	KD103V20-5BES *
Air inlet system	Turbo
Fuel	Diesel Fuel/HVO
Emission level	Emission optimization
Cylinder configuration	V
Number of cylinders	20
Displacement (l)	103.43
Bore (mm) * Stroke (mm)	175 * 215
Compression ratio	16 : 1
Speed 50Hz (RPM)	1500
Maximum stand-by power at rated RPM (kW)	3608
Piston type & material	Forged Steel
Charge Air coolant	Air/Water
Frequency regulation, steady state (%)	+/- 0.25%
Injection Type	Direct
Governor type	Electronic
Air cleaner type, models	Dry

Fuel system	
Maximum fuel pump flow (l/h)	1200
Max head on fuel return line (m fuel)	3,50
Maximum allowed inlet fuel temperature (°C)	70

Consumption with cooling system	PRP	ESP
Consumption @ 100% load (g/kW.h)	195	194
Consumption @ 75% load (g/kW.h)	210	205
Consumption @ 50% load (g/kW.h)	218	215
Consumption @ 25% load (g/kW.h)	246	242

Emissions

Lubrication System	
Oil system capacity including filters (l)	700
Min. oil pressure (bar)	3.70
Max. oil pressure (bar)	11
Oil sump capacity (l)	575
Oil consumption 100% ESP 50Hz (l/h)	1.69

Air Intake system	
Max. intake restriction (mm H2O)	510
Combustion air flow (l/s)	4781

Exhaust system

	PRP	ESP
Exhaust gas flow (L/s)	11352	12311
Exhaust gas temperature @ ESP (°C)	460	
Heat rejection to exhaust (kW)	2530	
Max. exhaust back pressure (mm H2O)	850	

Optional cooling system (HT/LT)	
Type of coolant	GENCOOL
Radiated heat to ambient (kW)	160
Heat rejection to coolant HT (kW)	1200
HT circuit flow rate (l/min)	1950
Outlet coolant temperature (°C)	95
Coolant capacity HT, engine only (l)	295
Max coolant temperature, Shutdown (°C)	103
Restriction pressure drop off engine – HT circuit (mbar)	700
Minimal pressure before HT pump (mbar)	400
Max. pressure at inlet of HT water pump (mbar)	2500
Thermostat begin of opening HT (°C)	71
Thermostat end of opening HT (°C)	81
HT Standard pressure cap setting (kPa)	100
Heat rejection to coolant LT (kW)	1000
LT circuit flow rate (l/min)	700
Temperature of inlet to LT engine water circuit (°C)	55
Coolant capacity LT, engine only (l)	105
Restriction pressure drop off engine – LT circuit (mbar)	700
Minimal pressure before LT pump (mbar)	400
Max. pressure at inlet of LT water pump (mbar)	2500
LT Standard pressure cap setting (kPa)	100

* Engine reference may be partially modified depending on genset application, options selected by the customer and lead time required.

KOHLER

KD4000-E

Diesel 50Hz generator set DATA SHEET - OPTIMIZED ON EMISSIONS

CHARACTERISTICS OF THE ENGINE

Template:	KD103V20	Bore:	175 mm (6.89")
Type:	Cylinder 4-stroke, 20 V	Course :	215 mm (8.46")
Aspiration:	Turbocharged, supercharged air cooled	Displacement:	103 l (6311 cubic inches)
Compression ratio:	16:0:1		
Control system for emissions:	Direct diesel injection, engine control module, turbocharger, booster air cooler		

EMISSION (EXHAUST) DATA:		5-mode weighted EPA D2 cycle
HC		0.4 g/kWh
NOx	(nitrogen oxides as NO_2)	6.0 g/kWh
CO	(carbon monoxide)	0.7 g/kWh
PM	(particles)	0.1 g/kWh

EMISSION DATA

Point in the cycle	100% ESP		100% PRP		75% ESP		75% PRP		50% PRP	
Power [kW]	3608		3280		2706		2460		1640	
Speed [tr/min]	1500		1500		1500		1500		1500	
NOx [g/kWh]	11,3		8,9		5,32		5,1		5,23	
CO [g/kWh]	0,11		0,14		0,34		0,38		1,0	
HC [g/kWh]	0,25		0,26		0,30		0,33		0,5	
PM [g/kWh]	0,004		0,004		0,017		0,02		0,07	
	to 5% O2	to 15% O2	to 5% O2	to 15% O2	to 5% O2	to 15% O2	to 5% O2	to 15% O2	to 5% O2	to 15% O2
HC [mg/Nm3]	87	32	87	33	93	35	101	38	151	56
NO x[mg/Nm3]	3916	1469	2991	1122	1641	615	1567	588	1575	590
CO [mg/Nm3]	39	15	46	17	105	39	117	44	302	113
PM [mg/Nm3]	1,4	0,5	1,3	0,5	5,2	2,0	5,8	2,2	21,2	7,9

TEST METHODS AND CONDITIONS

Test methods:

Emissions at steady state recorded to ISO8178-1 during operation at nominal engine speed (2%) and declared constant load (2%) with stabilized temperatures, pressures and rated engine emissions.

Fuel Specifications: Diesel EN590

Reference conditions:
Air inlet temperature: 25°C (77°F)
Fuel inlet temperature: 40°C (104°F)
Barometric pressure: 100 kPa (29.53 in. Hg) Humidity: 10.7 g/kg (75 grains H2O/lb) dry air. Intake restriction set at limit maximum allowable for a clean filter; Exhaust back pressure set to maximum allowable limit.

Data is from a single engine test conducted in accordance with the test methods whose fuel specifications and reference conditions are mentioned belowon, and depend on the instrumentation and possible variations from one engine to another. Any test performed using different test methods, instrumentation, fuel specifications and reference conditions may give different results.

Data and specifications subject to change without notice.

KOHLER. Industrial Diesel Generator Set – KD4000-E
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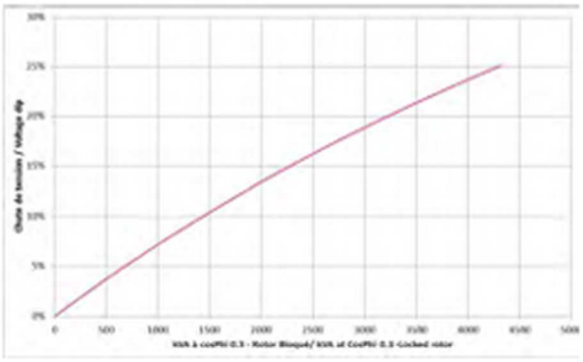
Alternator Specifications	
Alternator commercial brand	LEROY SOMER
Kohler Alternator description	KH08890T
Number of pole	4
Number of bearing	Dual Bearing
Technology	Brushless
Indication of protection	IP23
Insulation class	H
Number of wires	06
AVR Regulation	Yes
Coupling	Direct
Capacity for maintaining short circuit at 3 In for 10 s	Yes
Application data	
Overspeed (rpm)	2250
Power factor (Cos Phi)	0.80
Voltage regulation at established rating (+/- %)	0.50
Wave form : NEMA=TIF	<50
Wave form : CEI=FHT	<2
Total Harmonic Distortion in no-load DHT (%)	<3.5
Total Harmonic Distortion, on linear load DHT (%)	<3.5
Recovery time (Delta U = 20% transcient) (ms)	500
Performance datas	
Continuous Nominal Rating 40°C (kVA)	3780
Unbalanced load acceptance ratio (%)	8

Peak motor starting (kVA) based on x% voltage dip power factor at 0.3



Alternator Standard Features

- All models are brushless, rotating-field alternators
- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting
- The AVR voltage regulator provides superior short circuit capability
- Self-ventilated and dip proof construction
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds
- Superior voltage waveform

Note: See Alternator Data Sheets for alternator application data and ratings, efficiency curves, voltage dip with motor starting curves, and short circuit decrement curves.

KOHLER.

Industrial Diesel Generator Set – KD4000-E
50 Hz - Emission Optimized – EPA Tier 2 Compliant

Dimensions compact version

Length (mm) * Width (mm) * Height (mm)	6686 * 2248 * 2829
Dry weight (kg)	26000
Tank capacity (L)	-

* dimensions and weight without options

KOHLER.

Industrial Diesel Generator Set – KD4000-E
50 Hz - Emission Optimized – EPA Tier 2 Compliant

M80-D

The M80-D can be used as a basic terminal block for connecting a control unit and as an instrument panel with a highly intuitive LCD screen giving an overview of your generating set's basic parameters:

- Oil gauge
- Coolant temperature
- Oil temperature
- Engine speed
- Battery voltage
- Charge air temperature
- Fuel consumption
- etc.

The engine main functions can be controlled and events are recorded to facilitate diagnostics:

- Starting
- Speed adjustment
- Stopping
- Droop
- etc.

APM802

ADVANCED POWER PLANT MANAGEMENT CONTROL
Dedicated to power plant management APM802 provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility

- Graphic display with touchscreen
- User language selectable
- Specially researched ergonomics
- High level of equipment availability
- USB and Ethernet ports
- Modbus protocol
- Making it easy to extend the installation
- Complies with the international standard IEC 61131-3

KOHLER.

Industrial Diesel Generator Set – KD4000-E
50 Hz - Emission Optimized – EPA Tier 2 Compliant

STANDARD SCOPE OF SUPPLY

All our KD Series gensets are fitted with:

- Industrial water cooled DIESEL engine
- Electric starter & charge alternator 24 V D.C
- Electronic governor
- Standard air filter
- Single bearing alternator IP 23 T° rise/ insulation to class H/H
- Welded steel base frame with 85% vibration attenuation mounts
- M80-D control panel
- Flexible fuel lines & lub oil drain pump
- Fuel water separator filter
- Exhaust outlet with flexible and flanges
- User's manual (1 copy)
- Packing under plastic film
- Delivered with oil

STANDARD DELIVERY

All our gensets are fitted with:

- Industrial water-cooled DIESEL engine
- Electric starter & charge alternator
- Standard air filter
- Electric circuit breaker, adapted to the short-circuit current of the generating set
- Single bearing alternator IP 23 T° rise/ insulation to class H/H
- Welded steel base frame with 85% vibration attenuation mounts
- frame height optimized to allow it to be moved safely by forklift
- enclosure made of new high-quality European steel with enhanced corrosion resistance
- enclosures and base frames tested and analyzed by the French Corrosion Institut
- 100% of tanks tested for permeability
- Personal protection ensured by protective grilles on hot and rotating parts
- Separate 9 dB(A) silencer
- Fuel tank welded inside the genset frame
- Retention bund included for gensets up to 250 kVA ESP
- Emergency stop button on the outside
- Flexible fuel lines & lub oil drain cock
- Exhaust outlet with flexible and flanges
- User's manual (1 copy)
- Packing under plastic film

POWER RATINGS DEFINITION according to ISO8528-1 (2018-02 edition) and ISO-3046-1

Emergency Standby Power (ESP): The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Average load factor per 24 hours of operation is <85%.

Prime Power (PRP): At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour within 12 hour of operation. Average load factor per 24 hours of operation is <75%.

Data Center Mission Critical (DCP): Data Center Mission Critical power is defined as being the maximum power which a generating set is capable of delivering while supplying a variable or continuous electrical load and during unlimited run hours. Depending on the sites to supply and the availability of reliable utility, the generating set manufacturer is responsible to define what power level is able to supply to fulfil that requirement including hardware or software or maintenance plan adaptation.

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Industrial Diesel Generator Set – KD4000-E
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TERMS OF USE

According to the standard, the nominal power assigned by the genset is given for 25°C Air Intlet Temperature, of a barometric pressure of 100 kPA (100 m A.S.L), and 30% relative humidity. For particular conditions in your installation, refer to the derating table.

WARRANTY INFORMATIONS

Standard Warranty Period:

- for Products in "back-up" service
  - 30 months from the date the Product leaves the plant, **extended to 42 months for KD series**
  - 24 months from the Product's commissioning date, **extended to 36 months for KD series**
  - 1,000 running hours

  The warranty expires when one of the above conditions is met.

- for Products in "continuous" service (continuous supply of electricity, either in the absence of any normal electricity grid or to complement the grid),
  - 18 months from the date the Product leaves the plant, **extended to 30 months for KD series**
  - 12 months from the Product's commissioning date, **extended to 24 months for KD series**
  - 2,500 running hours, **extended to 8700 running hours for KD series**

  The warranty expires when one of the above conditions is met.

For more details regarding conditions of application and scope of the warranty please refer to our General "terms & conditions of sales".

TECHNICAL DATASHEET

PRODUCT DESCRIPTION:	FLOWGRID-24000262140 2270KW 43C AIR ON HORIZONTAL SINGLE CIRCUIT RADIATOR

General Specifications:		
Lenght(L):		11240 mm (approx.)
Width(W):		2400 mm (approx.)
Height(H):		1800 mm (approx.)
Weight(Empty):		3190 kg (approx.)
Weight(Filled):		3690 kg (approx.)
Inlet Collector:	(Single Inlet)	139,7 (5")
Outlet Collector:	(Single Outlet)	139,7 (5")
Collection Positions:	Same Side	

Heat Exchange Specifications:	Single Circuit	
Capacity	2276,96	kW
Exchange Surface	4128,15	m^2
Exchange Coefficent	37,71	W/m^2K

Air Side Specifications:	Single Circuit		
Altitute	100		m
Max. Air on temperature	43		C^o
Air outlet Temperature	72,7		C^o
Inlet Humidity	50		%
Outlet Humidity	12,4		%
Volumetric flow(Inlet/Outlet)	259.500	283.863	m^3/h
Mass Flow	274.281		kg/h
Velocity(Outlet)	3,38		m/s
Pressure Drop	100,8		Pa

Coolant Side Specifications:	Single Circuit		
Coolant	Water + 40% Eth. Glycol		(-23°C)
Inlet Temperature	88,2		C^o
Outlet Temperature	56,8		C^o
Flow Rate	69,00		m3/h
Velocity in the tubes	0,94		m/s
Velocity in Collectors	1,42		m/s
Inner Volume	496,47		lt.
Pressure Drop	31,89		kPa

Coil Specifications::	Single Circuit	
Tube Material	Copper	
Fin Material	Aluminium	
Fin Type	Flat	
Collector Material	Steel Pipe	
Tube thickness	0,35	mm
Fin thickness	0,15	mm
Fin Pitch	2,2	mm

Fan Specifications:	FLOWGRID
Number of Fans	18 pcs
Diameter of fan	800 mm
Fan RPM	891 rpm
Adjustable Angle	no

Electric Motor Specifications:	FLOWGRID
Power consumption per electric motor	1,50 Kw
Power consumption per radiator	27,00 Kw
Installed Electric Motor Power	1,94 Kw
Voltage	400 V
Frequency	50 Hz.
Phaze	3
Insulation Class	F
Protection Class	IP54
Thermal Overload Protection	Yes
Anti Condensation Heater	no

Sound Power and Pressure Level:	
Sound Power Level per Radiator	95 LwA (dBA)
Sound Pressure Level@1m.	71 LpA (dBA)
Sound Pressure Level@7m..	63 LpA (dBA)
Sound Pressure Level@10m..	61 LpA (dBA)

*** Sound Power Level Calculations is carried out in accordance with DIN EN ISO 13487 directives.

PRELIMINARY